

Architecture at South Kensington. In the same way, from a certain number of shipwrights' apprentices three or four were also selected every year to go up and study at the latter school. As regarded the Engineers, it was proposed that not merely three or four out of the thirty should be sent every year to South Kensington, but that all of them, after having been four years in the yards, should have the advantage of going through a course of one year's education at Greenwich, which should include all the higher branches of engineering education, such as metallurgy and chemistry. It was further proposed to take a similar course with reference to the shipwright's apprentices, but only as regarded a limited number, who would have an opportunity of studying naval architecture at Greenwich. The South Kensington School would be removed to Greenwich. . . . With regard to the cadets, it was not proposed that they should go to Greenwich. No definite arrangements had as yet been proposed with reference to them, but that there was no great hurry in the matter, because in future they would not be taken under fifteen years of age, and it would be as well to wait until those who had entered at thirteen had attained the latter age before new arrangements were entered into with regard to them."

We heartily congratulate the Government on this commencement of a higher scientific instruction of officers of the Navy, and trust that the course thus commenced will be persisted in.

NOTES

THE Royal Commission on Scientific Instruction and the Advancement of Science have, we are informed, concluded their inquiry into the scientific instruction afforded in training colleges and elementary schools, and in the science classes of the Science and Art Department.

THERE will be an election to a Natural Science Fellowship in Exeter College, Oxford, on Wednesday, June 19. The examination will be in Biology. The Fellow elected will be required to reside and take part in the instruction of the College. The election will take place under the conditions of the special ordinance of the College with regard to residence. The Fellow elected under the ordinance will be subject in all other respects to the Statutes of the College. The examination will probably begin on Tuesday, June 11, and no person can be admitted as a candidate who has not passed all the examinations necessary for the degree of Bachelor of Arts in the University of Oxford, or been incorporated as a graduate in the University. Candidates are requested to make application by letter to the rector on or before June 1.

THE examinations for Scholarships in Natural Science, which have recently been held at Clare and at Emmanuel College, Cambridge, have both terminated without an election being made. The reason of this is that at neither of the colleges did candidates present themselves, whose attainments, in the opinion of the examiners, entitled them to receive the distinction. The number of competitors was but small in each case, in one three only.

THE Vice-Chancellor of the University of Cambridge has promulgated the text of a memorial addressed to the University upon the subject of higher education, and adopted at a public meeting at Birmingham. It is similar to the memorials addressed upon the same subject from Rochdale, Leeds, Crewe, and the North of England Council for the Education of Women, and the prayer of the memorial is that a Syndicate be appointed to investigate the subject, and to inaugurate such means as would produce—firstly, a standard of excellence in the departments of literature, science, and art, fixed by some universally recognised authority, and attainable by students of this class, which would secure for their studies the definiteness and thoroughness that are so much needed; secondly, an opportunity, offered to all

who might be inclined to take advantage of it, of bringing their acquirements to the test of an examination; thirdly, the command of teaching power of a high order for the benefit of those who might wish to place themselves under instruction.

PROF. HUXLEY is, we learn from the *Times*, the favourite candidate for the rectorship of St. Andrew's University.

THE following are the probable arrangements for the Friday evening meetings at the Royal Institution after Easter:—April 12, Mr. John Morley, "On Rousseau's Influence on European Thought;" April 19, Mr. Vernon Harcourt, F.R.S., "On the Sulphurous Impurity in Coal Gas and the means of removing it;" April 26, Prof. Blackie, "On the Genius and Character of the Modern Greek Language." May 3, Wm. Spottiswoode, Treas. R.S.; May 10, N. Story-Maskelyne, F.R.S., "On Meteoric Stones;" May 17, Prof. Abel, F.R.S.; May 24, Prof. Clifford, "On Babbage's Calculating Machines;" May 31, Mr. E. J. Poynter, A.R.A. June 7, Prof. Odling, F.R.S. And the following lecture arrangements are announced:—Dr. Wm. A. Guy, F.R.S., three lectures, "On Statistics, Social Science, and Political Economy," on Tuesdays, April 9, 16, and 23; Mr. Edward B. Tylor, F.R.S., six lectures, "On the Development of Belief and Custom amongst the Lower Races of Mankind," on Tuesdays, April 30 to June 4;" Prof. Tyndall, F.R.S., nine lectures, "On Heat and Light," on Thursdays, April 11 to June 6; Mr. R. A. Proctor, five lectures, "On the Star Depths," on Saturdays, April 13 to May 11; Prof. Roscoe, F.R.S., four lectures, "On the Chemical Action of Light," on Saturdays, May 18 to June 8.

PROF. THISELTON DYER is about to deliver a course of lectures on flowers and fruits to the Royal Horticultural Society, with the following titles:—Thursday, April 11, "Flowers: their common plan of construction." April 25, "Flowers: the variety in their forms, and how brought about." May 9, "Flowers: their colours and odours." May 23, "Fruits: their structure." June 6, "How seeds are sown in Nature." June 20, "Flowers and Fruits under cultivation." The lectures will commence at 3 P.M.

M. SCHIMPER, the celebrated botanist and palæontologist, is the only one of the old professors in the French University of Strasburg who has consented to continue to hold his post under the German rule. M. Schimper is a Frenchman by birth and descent, and had been offered a superior position elsewhere by the French Government.

M. PRILLIEUX, the French botanist, having declined to continue an honorary Associate of the Leipsic Leopold Academy of Natural Science, some German professors call upon their countrymen to return the "brevets" they have received from French scientific bodies. But it is satisfactory to see Dr. Virchow coming forward to warn his colleagues against imitating such a bad example.

AN ingenious patent is now being worked, by which leather for the sides of boots and shoes is rendered impervious to wet and damp by exhausting the air from the pores of the leather, and filling them up with a substance which unites with and adheres to the fibre, thereby strengthening without impairing the elasticity of the material. It is stated that the patent, known as "Fanshawe's Waterproof Leather," is not only likely to be largely employed for the purpose to which we have referred, but that when asphaltic pavement becomes more general, it will be possible to shoe horses with a material as hard as the asphalt itself, and which will prevent them slipping.

A NOVEL and most interesting experiment in the field of elementary instruction has just been resolved upon in Saxony. Hitherto, as everywhere else, so in that small but highly-developed kingdom, the youth of the lower orders, upon being

apprenticed to a trade, have been left at liberty to forget the little they learnt at school. Attendance at Sunday schools and evening instruction provided by the State and charitable societies were perfectly optional. By a law just passed this liberty is abridged, and compulsory attendance at evening schools exacted for a period of three years. This is, we believe, the first time in the annals of the world that an attempt has been made by a State to extend the education of the humbler classes beyond the merest rudiments, and after they have entered upon the business of life. Saxony, already the best taught portion of Germany, will by the new law be more than ever in advance of her sister States.

It has been necessary to remove the Parliamentary copies of the Imperial standards, in consequence of the wall of the Palace at Westminster, in which they were immured, having been pulled down in order to form an entrance to the refreshment rooms. On the 7th of March, 1872, in the presence of the President of the Board of Trade and five other public functionaries, the standards were deposited in their new resting place in the wall on the right-hand side of the second landing of the public staircase, leading from the lower waiting-hall up to the Commons' Committee Room. One alteration has been made. When the standards were originally immured, a brass plate was fixed upon the wall bearing the following inscription in old English letters:—"Within this wall are deposited standards of the British yard and the British pound weight, 1853." The word "measure" has now been inserted after "yard."

In another column will be found an article on the recent meeting of the Iron and Steel Institute, referring, among other matters of interest, to the new puddling machine. We learn that an agreement has been entered into between Mr. Danks, the inventor, and a combination of iron manufacturers representing the different districts, whereby the latter undertake to have 200 furnaces on his plan put up within six months, and in consideration of this permission to do so, to pay him 50,000*l.* at that time, whether the furnaces are in operation or not. This step, which adds something like 450 furnaces to our producing power, will effect such a revolution as has never before occurred in the history of this branch of industry, and it is the more to be wondered at when it is remembered that, till July last, it was thought that hand-puddling must for ever continue, every machine to do away with it having, before that, entirely failed.

THE *Swiss Times* says that the late Professor Pictet-de-la-Rive has left the whole of his remarkable palæontological collection to the Museum of Natural History, and the greater part of his valuable scientific library to be divided between the Academic Museum and the Library of the city of Geneva.

WE learn with regret of the death, at his plantation, not far from Vera Cruz, of Dr. Charles Sartorius, a gentleman well known in the United States and Europe as a naturalist and meteorologist. Few students of the zoology and botany of Mexico have failed to become acquainted with the labours of the doctor, as shown by the numerous specimens sent to the museum of the Smithsonian Institution and to the American Entomological Society, &c.

THE French Minister of Agriculture and Commerce has ordered the institution at the Central School of Arts and Manufactures at Paris of a new course of lectures to be devoted to the higher teaching of agriculture.

THE Annual Meeting of French *savants*, held at Paris under the auspices of the Ministry of Public Instruction, will commence on Monday, April 1, at the Sorbonne, and continue on the three following days.

WE regret to learn that the proposed Dredging Expedition of the *Norna* is postponed, one of the party being seriously

ill, and her owner somewhat unexpectedly having to join his regiment in May instead of autumn. He is anxious to employ a vessel large enough to carry a good stock of fuel for a donkey engine, to save time and labour, and the *Norna* being small for this, and for carrying a steam launch, as is also to be desired, Mr. Marshall-Hall will, in all probability, part with her. If he is successful in organising the more extensive undertaking now proposed, he fully expects to contribute very interesting observations to marine science, and to investigate several chemical questions, besides the zoological work.

PROF. PEPPER, who has done good service in working some of the more popular and easily-illustrated departments of science at the Polytechnic, is about to leave that Institution, and to start an exhibition on his own account at the Egyptian Hall, Piccadilly, in conjunction with Mr. T. W. Tobin.

PROF. LUTHER has discovered a new planet (No. 118) of the 11th magnitude. The discoverer suggests the name "Peitho."

At the meeting of the Royal Geographical Society, held on Monday evening last, Mr. W. Giffard Palgrave read a paper, detailing a journey made by him during his late residence as Consul in Asia Minor. He began by giving a rough account of the general divisions of that region, confining himself more particularly, however, to that tract of country consisting of tableland, formerly known as Armenian, and where, moreover, the Tigris, Euphrates, and other important rivers take their rise. Many observations made of phenomena in the neighbourhood of the range of mountains known as the Kolat Tagh all tended to show beyond doubt that at some period or other glaciers must have formed and existed in large quantities in the immense tracts of mountains, though at the present time the climate is too genial to allow the snow to remain even on the ridges and peak throughout the year. A short insight was afforded into the volcanic features of the place, and also into the mineralogical formation of the soil. From this it appeared that mines, if only persons were found enterprising enough to work them, might be opened which would yield a surprising amount of lead and a considerable quantity of silver, and would most likely prove very lucrative.

THE educational importance of our large schools, not only to their actual pupils but to the inhabitants of the surrounding neighbourhood, is being happily illustrated at Taunton. An able lecture on "The Theory of Musical Tone," was delivered last week to a large audience in the College School Dining-hall by Mr. E. B. Tylor, F.R.S. It was largely illustrated by experiments, and the valuable apparatus was left behind him by the lecturer as a present to the School. It is hoped that other lectures on Science, Art, and Literature, will succeed; and that gentlemen of eminence will be found to aid, by their presence and teaching, so praiseworthy an attempt. For some time past the Botanical Lectures at the School have been attended not only by the pupils, but by a considerable number of strangers; and a class of forty students will present themselves for the approaching South Kensington Examination in Botany. There is already a small Botanical Garden, well furnished and laid out, which will be largely increased when the funds of the School permit. *O, si sic omnes!*

MR. FAIRGRIEVE, successor to Mr. George Wombwell, is about to sell by auction his well-known menagerie. The catalogue comprises 186 lots, and includes a large number of monkeys, ten lions and lionesses of various ages, a tiger and tigress, a male and female elephant, three boa constrictors, and a large number of other animals, and appurtenances. The sale will take place at Edinburgh, and will commence on April 9, unless the whole menagerie is previously disposed of by private contract.

GENTLEMEN interested in the improvement of Geometrical Teaching may obtain a copy of the Association's Second Annual

Report (referred to in last week's NATURE) on application to the Hon. Secretaries, King Edward's School, Birmingham, or to the London Local Secretaries, Mr. C. W. Merrifield, F.R.S., South Kensington, and Mr. R. Tucker, University College School.

MR. I. LOWTHIAN BELL read a paper at the Institution of Civil Engineers on Tuesday evening, March 18, "On the conditions which favour and those which limit the Economy of Fuel in the Blast Furnace for Smelting Iron." A discussion on the paper was taken at the following meeting on Tuesday evening last.

MR. ALFRED SMEE, F.R.S., has in the press a volume entitled *My Garden*, in which he gives a complete description of his experimental garden at Beddington, in Surrey, and details the results of his experience in the culture of flowers and fruit: of these nearly 700 species and genera are described. The volume also treats generally of the natural history, geology, and antiquities of the neighbourhood. It is illustrated with about 1,000 wood engravings, executed expressly for the work. The volume will be published by Messrs. Bell and Daldy.

ANNUAL ADDRESS TO THE GEOLOGICAL SOCIETY OF LONDON, FEB. 16, 1872

By J. PRESTWICH, F.R.S., PRESIDENT

IN looking at the labours of the Society during the past year, it is satisfactory to notice the same activity, the same wide range of subjects as ever, and the same independence of research for truth's sake which there ever should be. But, though good work has been done in special branches and the technical details of Geology, not so much progress has been made in its higher problems. I would, however, direct your attention to the steps made in grouping our volcanic rocks, and in the determination of the fauna of our Cambrian strata, which proves to be so much larger and richer than was anticipated a few years back. Both these subjects are in able hands, and cannot fail to yield important results, the latter especially in aiding to settle that interesting question—the true line of division between the Silurian and the Cambrian formations. On the subject of denudation and river-action, we have also had several excellent papers, and look forward with interest to the further development of the many original views which they have put before us.

The great question of the history of our globe during the Quaternary period seems also to be advancing towards more completeness. Many able observers, both in and out of our own Society, are engaged upon the subject, and various scientific periodicals and publications of our local societies are rich in contributions bearing upon this interesting subject. There is no more wonderful chapter in the earth's history than that which embraces the phenomena connected with the prevalence of great and exceptional cold immediately preceding our time,—the first dim appearance of man—his association with a race of great extinct Mammalia belonging to a cold climate—the persistent zoological characters of the one, so far as we have yet gone, in opposition to the variable types presented in geological time by the others—the search for connecting links, and the measure of man's antiquity,—all of which constitute theoretical problems of the highest interest, and are now occupying the attention of geologists of all countries. Allied also to this subject are the great questions relating to the form of our present continents—the elevation of the land—the origin of valleys and plains—and of all that which prepared this globe for the advent of man.

But while treating of these abstract and philosophical questions, geology deals also with the requirements of civilised man, showing him the best mode of providing for many of his wants, and guiding him in the search of much that is necessary for his welfare. The questions of water-supply, of building materials, of metalliferous veins, of iron and coal-supply, and of surface-soils, all come under this head, and constitute a scarcely less important, although a more special branch of our science than the palæontological questions connected with the life of past periods, or than the great theoretical problems relating to physical and cosmical phenomena. Looking at this triple division of geology, and seeing that the first, or applied geology, is, as it were, only

incidental to our general studies, and therefore not often the topic of our discussions, notwithstanding its practical importance, I propose on this occasion to say a few words in connection with the two momentous subjects which, during the last few years, have been made the objects of investigation by two Royal Commissions,* on both of which the geological questions have received much and careful consideration. I shall here restrict myself to the more special geological bearings of the subject, extending them, however, in some directions beyond the scope of the original inquiries, and refer you to the Reports and Minutes of Evidence themselves for the many valuable economical questions and practical details which are there discussed.

Our Springs and Water-supply.

The site of a spring or the presence of a stream determined probably the first settlements of savage man; and his civilised descendants have continued, until the last few years, equally dependent upon like conditions—conditions connected first with the rainfall, and, secondly, with the distribution of the permeable and impermeable strata forming the surface of the country. Under ordinary circumstances, few large towns have arisen except where there has been an easily accessible localised water-supply, and where the catchment-basin on which depends the volume of the rivers has been large, and permeable strata prevail. Take, for example, London. Few sites could be more favourable in every respect. Beneath it are strata rich in springs, while at a distance there is that large development of those massive permeable strata so necessary to maintain a sufficient and permanent flow in our rivers. As the conditions exhibited in the London basin afford all the illustrations we need for our subject, I will confine myself in this address to that area alone.

London north of the Thames stands on a bed of gravel, varying in thickness from ten to twenty feet in round numbers, and overlying strata of tenacious clay from 100 to 200 feet. The former being easily permeable, the rain falling on its surface filters through it, until stopped by the impermeable London clay, where it accumulates and forms a never-failing source of supply to the innumerable shallow wells that have been sunk all over London from time immemorial, and which for centuries constituted its sole water-supply. Not only does it form an easily accessible underground reservoir, although of limited dimensions; but where the small intersecting valleys cut down through the bed of gravel into the London clay, a portion of the water in this reservoir escapes at the junction of the two strata, and gives rise to several springs formerly in much repute, such as those of Bagnigge Well, Holywell, Clerkenwell, St. Chad's Well, and others.

The early growth of London followed unerringly the direction of this bed of gravel, eastward towards Whitechapel, Bow, and Stepney; north-eastward towards Hackney, Clapton, and Newington; and westward towards Chelsea and Kensington; while northward it came for many years to a sudden termination at Clerkenwell, Bloomsbury, Marylebone, Paddington, and Bayswater; for north of a line drawn from Bayswater by the Great Western station, Clarence Gate, Park Square, and along the north side of the New Road to Euston Square, Burton Crescent, and Mecklenburg Square, this bed of gravel terminates abruptly, and the London clay comes to the surface, and occupies all the ground to the north. A map of London, so recent as 1817, shows how well-defined was the extension of houses arising from this cause. Here and there only beyond the main body of the gravel there were a few outliers, such as those at Islington and Highbury; and there habitations followed. In the same way, south of the Thames, villages and buildings were gradually extended over the valley-gravels to Peckham, Camberwell, Brixton, and Clapham; while, beyond, houses and villages rose on the gravel-capped hills of Streatham, Denmark Hill, and Norwood. It was not until the facilities were afforded for an independent water-supply by the rapid extension of the works of the great water companies, that it became practicable to establish a town population in the clay districts of Holloway, Camden Town, Regent's Park, St. John's Wood, Westbourne, and Notting Hill.

On the outskirts of London a succession of villages grew up for miles on the great beds of gravel ranging on the east to Barking, Ilford, and Romford—on the north, following the valley of the Lea to Edmonton and Hoddesdon; and on the West, up the Thames-valley to Ealing, Hounslow, Slough, Hammersmith,

* Royal Commission on Water Supply, appointed April 1867. Report of the Commissioners and Minutes of Evidence and Appendix, June 1869.

† Royal Commission on Coal Supply, appointed June 1866.

Reports of the Commissioners, Minutes of Evidence, Appendix, July 1871.